

IN THE CLAIMS:

Please amend claims 1, 8, 9 and 11 as follows:

1. (Currently Amended) A magnetic recording medium, the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, the proportion of functional groups having N atoms per 100 carbon atoms in a diamond-like carbon protective mainly composed of carbon for protecting the magnetic film exceeds 20% , ~~and~~ ~~includes at least a functional group having N atoms.~~
2. (Original) The magnetic recording medium according to claim 1, wherein a lubricating film of perfluoroether having at least one functional group is provided on the protective coating.
3. (Original) A manufacturing method for a magnetic recording medium, in a manufacturing method for a magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, characterized in that when a protective film mainly composed of carbon for protecting the magnetic film is formed by an ion beam method or a chemical vapor deposition method, at least one gas among CO<sub>2</sub>, NO<sub>2</sub>, N<sub>2</sub>O is added.
4. (Original) The manufacturing method for a magnetic recording medium according to claim 3, wherein the protective coating is diamond-like carbon.
5. (Original) The manufacturing method for a magnetic recording medium according to claim 3, wherein when the protective coating is formed by the ion beam method or the chemical vapor deposition method, at least one of N<sub>2</sub>, Ne, Ar, Kr, Xe and hydrocarbon gas or hydrocarbon gas is used.
6. (Original) A manufacturing method for a magnetic recording medium, in a manufacturing method for a magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, characterized in that when a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film is

formed by an ion beam method or a chemical vapor deposition method, at least one gas among  $\text{CO}_2$ ,  $\text{NO}_2$ ,  $\text{N}_2\text{O}$  is added.

7. (Currently Amended) A manufacturing method for a magnetic recording medium, in a manufacturing method for a magnetic recording medium having a magnetic film, a protective coating mainly composed of carbon for protecting the magnetic film and a lubricating film of perfluoroether having at least one functional group on a non-magnetic substrate, characterized in that when the protective coating is formed by an ion beam method or a chemical vapor deposition method using at least one of  $\text{N}_2$ , Ne, Ar, Kr, Xe and hydrocarbon gas or hydrocarbon gas, at least one gas among  $\text{CO}_2$ ,  $\text{NO}_2$ , and  $\text{N}_2\text{O}$  is added. ~~A magnetic~~

8. (Currently Amended) A magnetic storage apparatus, comprising a magnetic recording medium that in the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, a proportion of functional groups having N atoms per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, ~~and included at least a functional group having N atoms~~, and a lubricating film of perfluoroether having at least one functional group provided on the protective coating,

a driving part for driving the magnetic recording medium,  
a magnetic head having a recording part and a reproducing part,  
a recovery reproducing signal processing part for giving and receiving a signal to and from the magnetic head, and a magnetoresistive head as the reproducing part of the magnetic head.

9. (Currently Amended) A magnetic recording medium, the magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, the proportion of functional groups having N atoms per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, ~~and including at least a functional group having N atoms~~.

10. (Previously Added) The magnetic recording medium according to claim 9, wherein a lubricating film of perfluoroether having at least one functional group is provided on the protective coating.

11. (Currently Amended) A magnetic storage apparatus, comprising a magnetic recording medium having a magnetic film on a non-magnetic substrate by intercalating at least an under layer, a proportion of functional groups having N atoms per 100 carbon atoms in a diamond-like carbon protective coating mainly composed of carbon for protecting the magnetic film exceeds 20%, ~~and includes at least a functional group~~, and a lubricating film of perfluoroether having at least one functional group provided on the protective coating.

a driving part for driving the magnetic recording medium, a magnetic head having a recording part and a reproducing part,

a recording reproducing signal processing part magnetic head, and a magnetoresistive head as the reproducing part of the magnetic head.